NEW CASTLE TOWN BEACH

Water Quality Report
Summer 2008

NH Department of Environmental Services

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New Castle Town Beach, New Castle
Water Quality Report
Summer 2008

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Table of Contents

History of the Beach Program 4
Beach Statistics 5
Assessing Your Beach 6
Sampling Frequency and Location 6
Coastal Water Quality Standards and 2008 Results 8
New Castle Town Beach Adopt-a-Beach Program 9
Concerns 11
Future Projects 11

List of Figures

Figure 1. New Castle Town Beach Access Points and Restroom Facilities. 5
Figure 2. New Castle Town Beach Monitoring Stations. 7
Figure 3. New Castle Town Beach 2008 Enterococci Data. 10

List of Tables

Table 1. New Castle Town Beach Station Descriptions and Latitude/Longitude Points. . 7

Appendices

Appendix A: 2008 Special Report – Stormwater Modeling 12
Appendix B: New Castle Town Beach 2008 Data by Date 12

History of the Beach Program

The New Hampshire Department of Environmental Services (DES) recognizes a public health threat may exist within recreational waters and tests the water at the state's beaches to ensure swimmers are not exposed to disease-causing pathogens or cyanobacteria scums. The DES has operated a Public Beach Inspection Program, commonly called the Beach Program, for over 20 years.

The New Hampshire coastal beach monitoring program was initiated in 1989 with the DES inspecting five beaches. In October 2000, the United States Congress amended the Clean Water Act to include the BEACH Act. The Environmental Protection Agency (EPA) could now was now authorized to award grants to eligible states to develop and implement monitoring and notification programs. These programs protect the public from exposure to pathogenic microorganisms in coastal recreation waters.

The DES first received grant funds in 2002. Since then the New Hampshire Beach Program has successfully met all of EPA's performance criteria requirements (*National Beach Guidance and Required Performance Criteria for Grants*) and continues to expand the monitoring and notification program. Weekly summer monitoring throughout the state was conducted at nine beaches in 2002, and has since doubled to 16 by 2008. The Beach program strives to expand sampling to include all coastal New Hampshire beaches.

Coastal beaches are monitored for the presence of the fecal bacteria *Enterococci* which are present in the intestines of warm-blooded animals including humans. Fecal bacteria, when present in high concentrations and ingested, can commonly cause gastrointestinal illnesses such as nausea, vomiting and diarrhea. These indicator organisms signify the possible presence of other potentially disease-causing organisms in the waterbody.

Beach monitoring and bacteria source tracking have been implemented to protect public health. In a collaborative effort, the DES Beach program, towns, beach managers, recreational directors and health inspectors encourage public awareness of sources of pollution and environmental responsibilities. Thank you for your interest and concern in New Hampshire's water quality.

Beach Statistics

New Castle Town Beach is owned and maintained by the town of New Castle. It is located on Route 1B. The beach season runs from May 15 to September 15. During the season, beach use is allowed between 9:00 A.M. and 9:00 P.M.

New Castle Town Beach is a 840-foot long sandy and rocky beach. The beach is used by the public for swimming and general relaxing. There are two access points to the beach area from the Great Island Common and Ocean Street (Figure 1). Lifeguards are not present throughout the summer, but toilet facilities are available.

Waterfowl are frequently observed at the beach; the most commonly observed are gulls. There are restrictions for dogs on the beach, and no dogs were observed during any of the 2008 inspections.

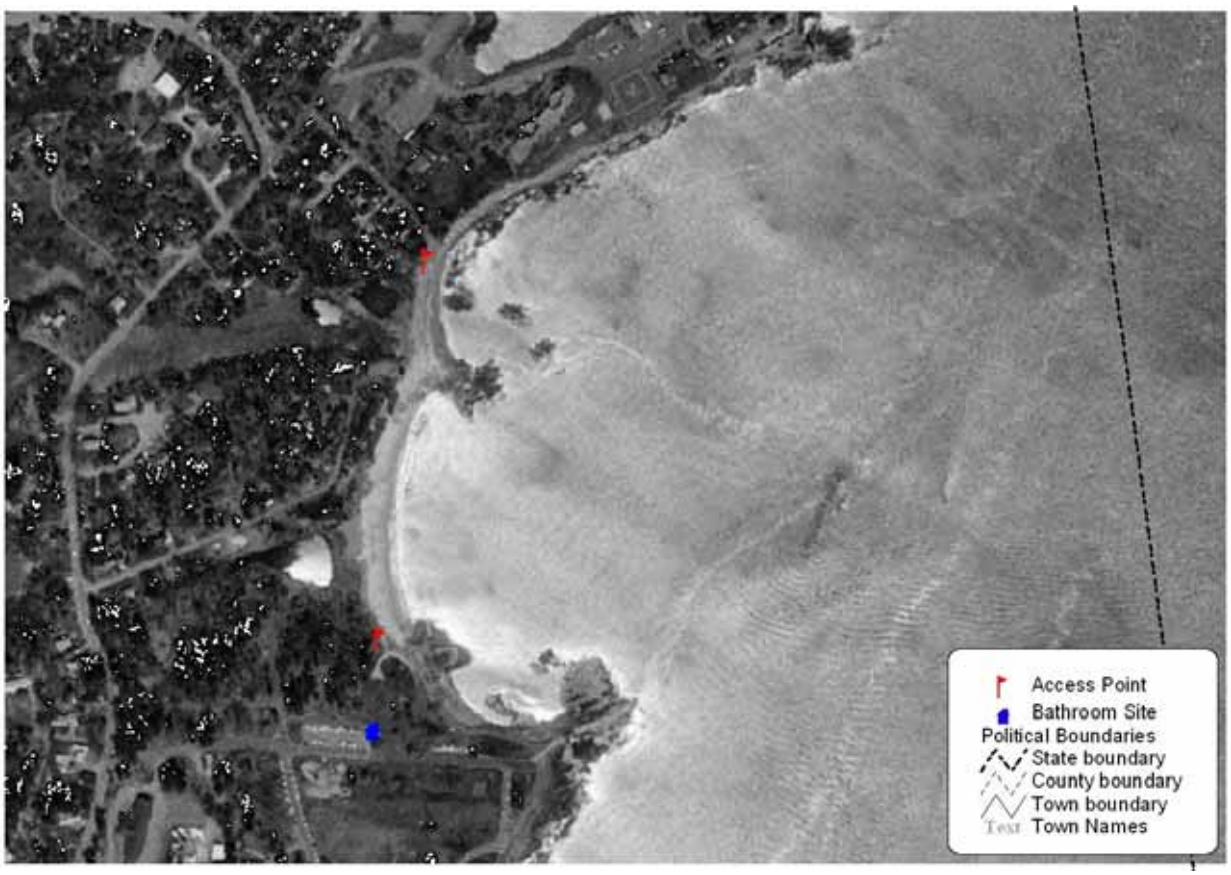

Figure 1. New Castle Town Beach Access Points and Restroom Facilities.

Assessing Your Beach

Sampling Frequency and Location

The Beach Program developed a risk-based beach evaluation process and tiered monitoring approach during the 2003 beach season based on the EPA performance criteria. Beaches are evaluated annually to determine potential health threats to the public. Evaluations are based on several criteria within three main categories: beach history, microbial pathogen sources, and beach use. Beaches are now assessed as impaired for bacteria based on the most recent version of the Consolidated Assessment and Listing Methodology (CALM). The CALM assesses beach units as impaired based on historical exceedances of both the single sample and geometric mean bacteria standards. This report is submitted to EPA every two years.

Based on the evaluations, beaches are assigned a Tier I, Tier II, or Tier III status. Tier I beaches are considered “high priority” and have an increased potential to affect public health. Tier II beaches are “medium priority” and Tier III are “low priority” beaches that have less potential to affect public health. Beach sample frequency is based on Tier status; Tier I beaches are sampled twice per week, Tier II beaches are sampled once per week, and Tier III beaches are sampled every other week.

The number of samples collected at each beach is determined by the beach length. Beaches less than 100 feet in length are sampled at left and right locations one-third of the distance from either end of the beach. Beaches greater than 100 feet in length are bracketed into thirds and sampled at left, center and right locations. Routine sample collection may be enhanced by sampling known or suspected pollution sources to the beach area. Storm event sampling may be conducted at beaches where watershed runoff resulting from rainfall is expected to impact beach water quality.

At New Castle Town Beach, samples are collected at the left, center, and right stations regularly (Table 1). All stations are evenly distributed along the shoreline (Figure 2) and can be accessed via the Great Island Common (Figure 1). Additional samples were also collected from the drainage pipe located north of the beach area (Table 1) when the tide was low.

Table 1. New Castle Town Beach Station Descriptions and Latitude/Longitude Points.

Station Description	Latitude	Longitude
Left Station: Located in front of a wood clapboard house near the north end of the beach.	43° 4' 3.9517"	-70° 42' 47.7898"
Center Station: Located between a gulley and a brown house with a chimney and sunroom.	43° 4' 1.2368"	-70° 42' 48.2041"
Right Station: Located in front of the first pine tree on the left as you enter the beach area from the park.	43° 3' 59.4561"	-70° 42' 47.9113"
Pipe Station: Located just across a berm from New Castle Town Beach. It can be accessed from the beach or from Ocean Drive off Route 1B.	43° 4' 7.838"	-70° 42' 46.3721"

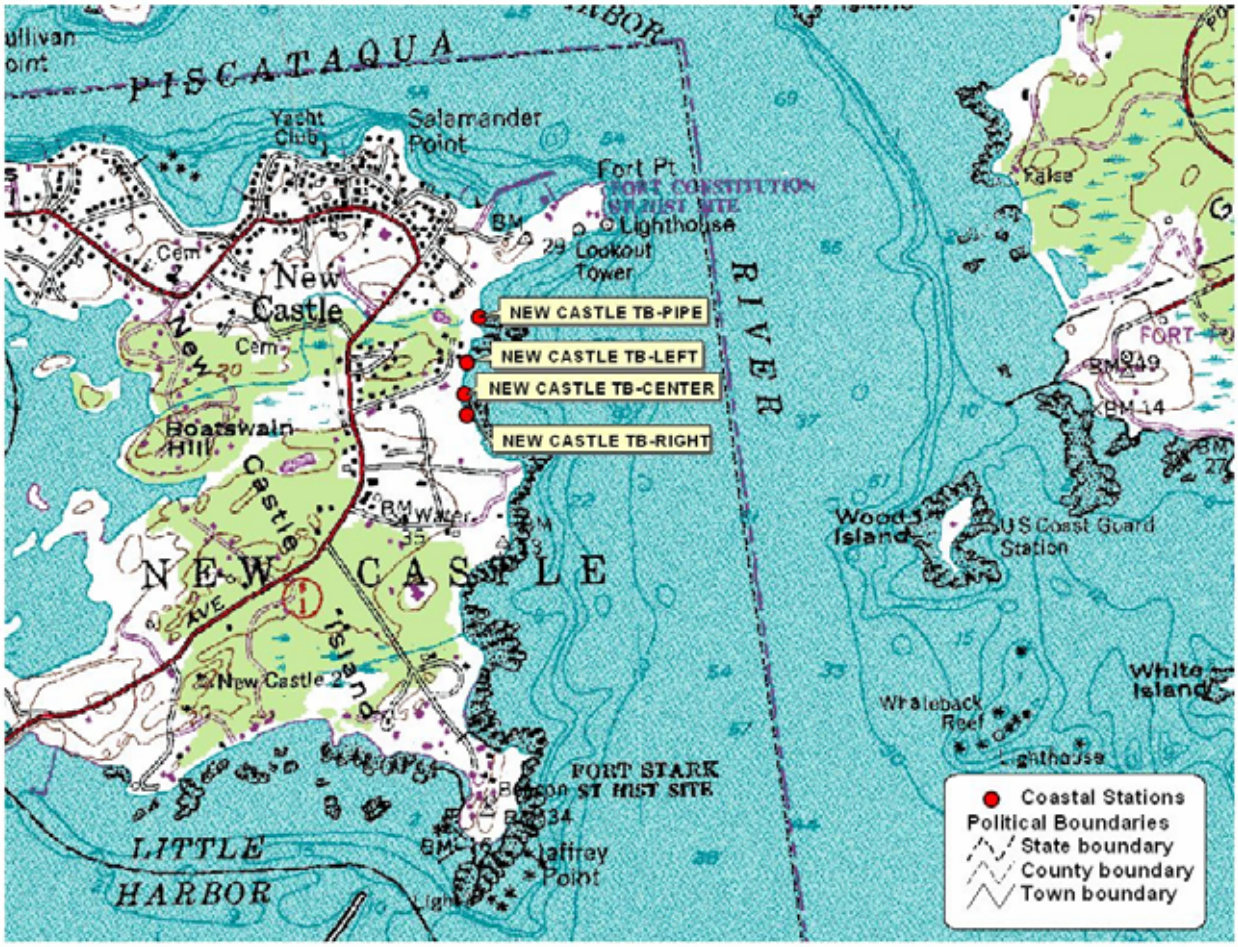

Figure 2. New Castle Town Beach Monitoring Stations.

Coastal Water Quality Standards and 2008 Results

Beaches are monitored to ensure compliance with State water quality standards. Marine waters are analyzed for the presence of the fecal bacteria Enterococci. Enterococci are known as indicator organisms, meaning their presence may indicate the presence of other pathogenic organisms. The State standard for Enterococci at public beaches is 104 counts/100 mL water in one sample, or a geometric mean of 35 counts/100 mL in at least three samples collected over sixty days. When samples exceed the standard, a beach advisory is issued, at which point the beach manager is notified and signs are placed at the entrances to the beach to warn the public of the potential health threat posed by water contact at the beach. Beach advisories remain in effect until subsequent beach sampling indicates safe water quality conditions.

The 2008 sampling season began May 27th. The sampling season encompassed 96 days. Precipitation was recorded on 42 days over the summer (based on precipitation recorded at the Pease Air National Guard weather station). June wetfall totaled 5.79 inches while July and August yielded 8.86 and 2.6 inches of rain respectively.

At New Castle Town Beach, 34 routine inspections were conducted throughout the summer of 2008, with four additional inspections conducted in September. One hundred and two Enterococci samples were collected from the beach and known point source (Appendix B). Overall, the 2008 summer Enterococci levels were moderate and occasionally above the State's standards for New Castle (Figure 3), with three advisories issued.

The first advisory occurred on July 1, when the left, center, and right samples each contained elevated levels of bacteria at 510, 60, and 80 counts per 100 mL respectively. An advisory was posted and the beach was re-sampled on July 3. Unfortunately a high Enterococci count (210/100 mL) persisted at the left station, so the advisory remained in effect. Sampling on July 5 showed that bacteria levels had decreased to a normal level and the advisory at New Castle was lifted. Field inspection data sheets from July 1 and 3 indicated that the water at the beach was extremely turbid. When water along the shoreline is turbid, it signifies that sediments have been disturbed. Some sources of turbidity may be offshore currents; people induced recreational activities or beach erosion. Some studies have shown the presence of bacteria in some beach sediments. This sediment bacteria may be a source to the water column when the sediment is disturbed. Sediment induced bacteria may have a possible link the elevated bacteria levels measured at the beach in early July.

The second advisory at New Castle Town Beach occurred on July 21, when the right station had a count of 190 Enterococci/100 mL. Nearly two inches of rain had fallen 24 hours prior to sampling, and it is likely that this storm event contributed to the high levels of bacteria. Large amounts of wetfall may flush bacteria from the surrounding watershed into the beach area, causing elevated Enterococci counts. The field inspection sheet for this day also noted that the water condition at the right station was dark and murky, while water at the left and center stations was clear. An advisory was

posted, and when the beach was re-sampled on July 23, the right sample had decreased to within the State's standard for designated beaches.

On August 18, the final advisory of the summer was posted at New Castle Town Beach. The sample from the left station had an extremely high count of 2,240 Enterococci/100 mL. It is unclear what may have caused this large and uncharacteristic spike in bacteria level. Re-sampling took place on August 20, and bacteria levels at all stations were found to be at or below 10 counts/100 mL.

New Castle Town Beach Adopt-a-Beach Program

In response to growing concern over the amount of litter and marine debris impacting visual and environmental aspects of New Hampshire's beaches, the Beach Program partnered with the Portsmouth based Blue Ocean Society for Marine Protection. Both parties met in the spring of 2005 to discuss the development of an Adopt-a-Beach Program. The Blue Ocean Society agreed to add New Castle Town Beach to their Adopt-a-Beach Program and the Beach Program agreed to supply all necessary materials for adopting the beach.

Volunteers conducted beach clean-ups about once per month between April and October at New Castle Town Beach in 2008. All items found are recorded on data cards and the tallies are sent to the Blue Ocean Society to track the trash trends. The trash is also weighed at the end of the clean up. The most numerous items found during the six clean up events were cigarette butts, plastic bags, and bottle caps. The combined weight of trash collected was 85 pounds.

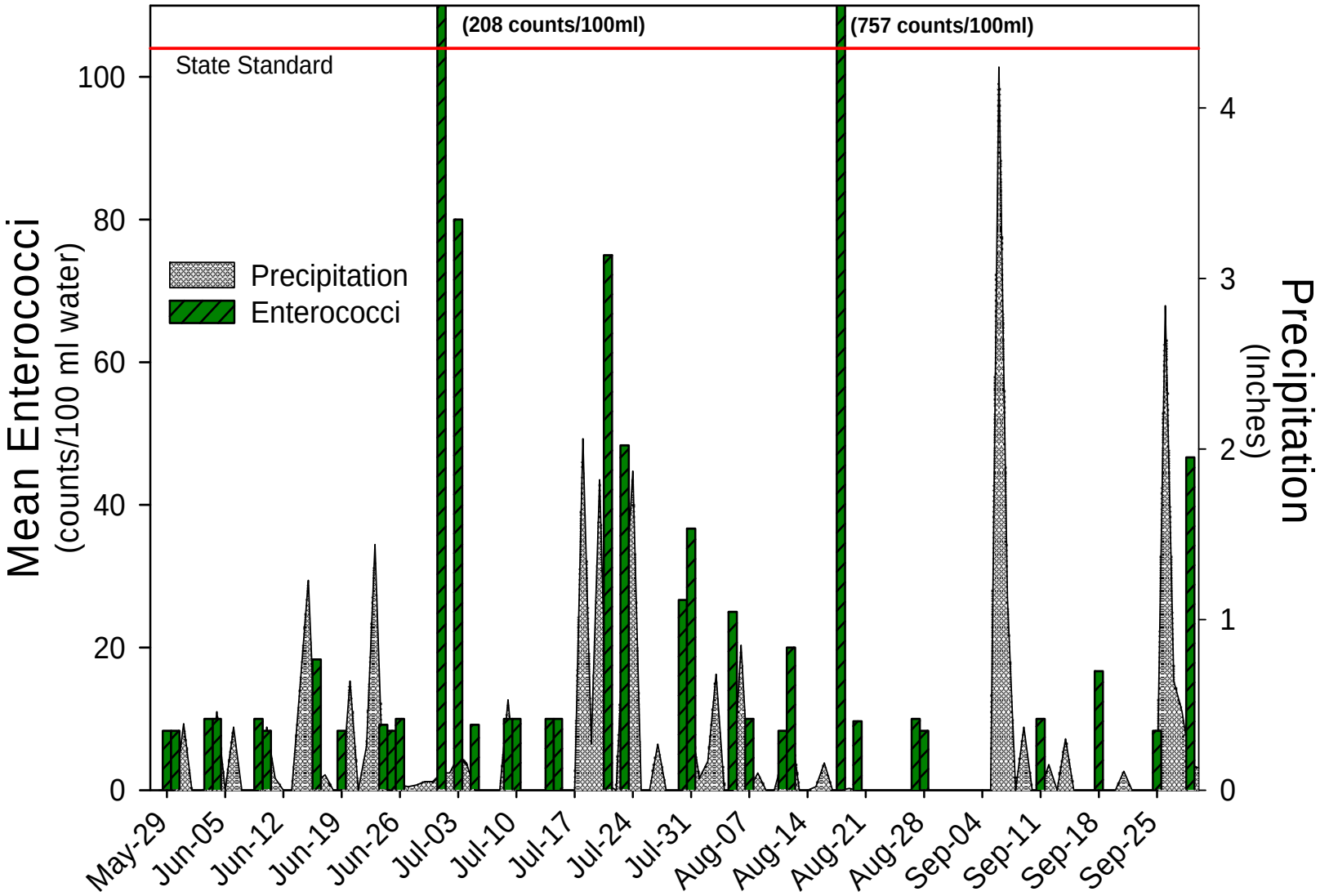

Figure 3. New Castle Town Beach 2008 mean Enterococci results. Three advisories were posted at New Castle Town Beach after the sampling on July 1& 3, July 21, and August 18, 2008. On July 21, the right station had 190 counts/100 ml of water, exceeding the state standard for a single sample and initiating the posting of an advisory. See Appendix B for all results from all stations for the 2008 sampling season.

Concerns

A series of wetland systems drain Little Harbor and culminate in a small duck pond that discharges through a pipe beyond the left end of New Castle Town Beach. The Beach Program collected a few samples from this pipe during the summer, and bacteria results were high and frequently above the State standard. Discharge from the pipe may negatively impact the beach area water quality, as ocean currents may wash the discharge into the New Castle Town Beach area. Through the joint efforts of the Beach Program and the University of New Hampshire's Jackson Estuarine Laboratory, a microbial source tracking study was conducted in 2006 to determine the major sources of bacteria discharged by the pipe. The study concluded that the dominant bacteria sources are wild animals, birds, and humans. The pipe discharge is possibly a contributing factor to elevated Enterococci levels at New Castle Town Beach (Microbial Pollution Source Tracking at New Castle Beach, S. H. Jones, 2007). The final report is available on the NH DES website at the following address: **http://des.nh.gov/organization/divisions/water/wmb/beaches/beach_reports/index.htm**

Future Projects

- The DES Beach Program encourages participation between the town of New Castle, local businesses, or school groups and the Adopt-a-Beach Program. The program promotes beach clean-ups and water quality monitoring. The DES would conduct training sessions and participate in education and outreach activities for the community.

- A study to document the beach sand bacteria concentrations at New Castle Town Beach might be warranted. Despite the results from NH DES studies to the contrary, studies in other areas of the country have shown concentrated populations of bacteria in the onshore sand near the water line. Initiating a project at the beach could document if bacteria proliferates in the sand and contributes bacteria populations. If the town is interested in pursuing a scientific beach sand and interstitial water study, the Beach Program can provide funds to support the research.

- Discharge from Bull Toad Pond impacts the beach area during the spring/early summer months. This discharge likely contains elevated bacteria levels from marsh runoff. DES recommends restricting access to the discharge. Young children tend to play in these warmer waters and may be subjected to a health risk. The area can be roped off with a warning sign that states "this water may contain elevated bacteria levels".

For more information regarding Adopt-A-Beach, possible studies, or signage for the beach, please contact Sonya Carlson at (603) 271-0698 or sonya.carlson@des.nh.gov.

Appendix A: 2008 Special Report – Stormwater Modeling

When rain falls over the land, it flushes bacteria and other contaminants that have accumulated on the landscape to our beaches. As impervious areas like pavement and buildings are constructed in a subwatershed, more runoff contaminants are carried to our beaches. In addition to increased impervious cover as a result of land use changes, New Hampshire has recently experienced substantial and prolonged wetfall events. With increased flushing of the landscape combined with expanded impervious cover, it is imperative for local and state governments to explore new management techniques to protect New Hampshire beaches from contaminant sources.

DES Beach Program monitors New Hampshire coastal waters for potentially pathogenic bacteria. The DES has been monitoring these beaches since 1989 and has amassed large amounts of bacterial information for most coastal beaches. This collected information over the past years can be used to predict bacteria counts that can be expected with present and future development.

The DES Beach Program is proactive and always researching new management practices that can improve beach quality and new techniques to accelerate the beach advisory notification process. Beach Program personnel sample coastal beaches 4 days a week. Advisories are issued once state bacteria standards are exceeded. Despite our protective efforts, at least 24 hours pass from sample collection to bacteria count determination. During this time DES and swimmers are unaware of bacteria levels. The period of time between monitoring and sample analyses certainly put swimmers at risk for potential illness.

Two important Beach Program goals are to determine watershed contribution of bacteria to coastal beaches and to predict bacterial concentrations during and after a rain event. Mathematical models can be used to ascertain categories of bacteria sources and to predict bacteria concentrations after a rain event. Such models are complex and require a great deal of expertise and technical skill. The DES has selected FB Environmental to utilize an appropriate model and to train Beach Program personnel how to apply the model. With detailed predictions of how wetfall will affect bacteria transport to coastal beaches, future buildout planning, mediation, and construction could be guided by a stormwater model. The DES hopes the model will provide a useful tool for town officials and law makers to improve public notification and protect public health.

With the ability to predict public beach bacterial concentrations DES could immediately post an advisory based on predicted values and conduct follow up sampling for verification. A predictive model would allow advisories to be posted as soon as a public health threat occurs. Collecting samples during times of predicted high bacteria levels will help DES verify the accuracy and precision of the model. A model can be an effective tool in helping us achieve our mission to protect the public from exposure to waterborne illness while enjoying New Hampshire waters.

In addition to coastal bacteria data, the model will incorporate land use categories, hydrology, topography, historical precipitation records, historical tide data, and waste management. The data collection effort for this project has been time consuming and required help from several sources outside the DES. The DES would like to thank the National Oceanic and Atmospheric Association, the National Climatic Data Center, the Seabrook Nuclear Power Station and the Pease Air National Guard Base Weather Station for providing data. The model is only as good as the data we input, so we strive for the best quality controlled verified data available. The project is due for completion in early 2009.

Appendix B: New Castle Town Beach 2008 Data by Date

Date	Enterococci (count/100 mL)				Tide Height (feet)	Rainfall in previous 24 hours (inches)	Number of bathers	Animal Presence
	Left	Center	Right	Pipe				
5/29/08	< 10	< 10	< 5		0.79	0	0	0
5/30/08	< 10	< 5	< 10		4.78	0	2	0
6/3/08	< 10	< 10	< 10		9.29	0	0	4 gulls
6/4/08	< 10	30	10		8.41	0.23	0	0
6/9/08	< 10	10	10		0.85	0	10	0
6/10/08	< 10	< 5	10		0.88	0	100	0
6/16/08	30	20	< 5		8.3	0.01	5	2 gulls
6/19/08	< 10	< 10	< 5		8.2	0	15	8 gulls
6/24/08	< 10	< 10	< 10		1.99	1.53	5	0
6/25/08	< 10	< 10	< 5		2.4	0.01	20	0
6/26/08	< 10	< 10	10		1.8	0		
7/1/08	510	60	80		7.16	0	15	0
7/3/08	210	< 10	20		5.47	0.10	3	0
7/5/08	< 10	< 10	10		0.44	0	0	0
7/9/08	< 10	10	< 10		0.85	0	15	0
7/10/08	< 10	< 10	< 10		1.4	0.02	0	0
7/14/08	< 10	< 10	< 10		5.68	0	0	0
7/15/08	< 10	< 10	< 10		7.27	0	15	0
7/21/08	20	20	190		5.2	1.82	0	5 gulls
7/23/08	5	40	100		4.56	0	0	0
7/30/08	< 10	20	50		7.96	0	2	0
7/31/08	< 10	20	80	140	8.35	0	5	5 gulls
8/5/08	60	5	10	170	6.51	0	5	15 gulls
8/7/08	< 10	< 10	< 10	540	1.82	0.50	0	9 ducks
8/11/08	10	< 5	< 10	90	3.22	0	0	0
8/12/08	30	10	20		6.5	0.45	0	1 gull, 1 duck
8/18/08	2240	20	10	< 10	7.42	0	15	0
8/20/08	9	< 10	10		7.2	0	5	0
8/27/08	< 10	< 10	< 10		5.76	0	4	5 gulls
8/28/08	< 10	< 10	5		6.46	0	0	0
9/11/08	< 10	< 10	< 10	230	3.43	0	0	0
9/18/08	< 10	10	30	40	7.15	0	2	1 gull
9/25/08	< 10	< 5	< 10		3.2	0	0	1 gull
9/29/08	50	30	60		8.14	0.31	0	5 gulls